Insert to Application for Individual Permit

Reconstruction of a Section of U.S. 212 (FH 4)
The Beartooth Highway
Park County, Wyoming

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Block 16. Other Location Descriptions

The project area is located in: Sections 6, 7, 8, 11, 12, 14, and 18, Township 57 North, Range 106 West; Sections 1, 4, 5, 7, 8, 9, 10, 11, and 12, Township 57 North, Range 105 West; Section 6, Township 57 North, Range 104 West; Section 36, Township 58 North, Range 105 West; Sections 15, 21, 22, 28, 29, 30, 31, 32, and 33, Township 58 North, Range 104 West, Section 30 Township 58 North, Range 107 West in Park County, Wyoming, and Section 5, Township 57 North, Range 107 West, and Section 17, Township 57 North, Range 107 West. The project area consists of a corridor along 30.1 km (18.7 mi.) of paved highway, a proposed workcamp, and material sources.

Block 18. Nature of Activity

Project Area Description

The project area falls within a larger area designated as U.S. Highway 212 and Wyoming Forest Highway 4, and known locally as the Beartooth Highway. Segment 4 of the Beartooth Highway, the section proposed for reconstruction in this permit application, is in the Shoshone National Forest (SNF), and is maintained by the National Park Service (NPS). The Federal Highway Administration (FHWA), the applicant, in cooperation with the SNF and the NPS, proposes reconstruction of segment 4 of the Beartooth Highway.

The project area ranges in elevation from 2,700 m to 3,322 m (8,880 ft. to 10,900 ft.). Vegetation in the project area includes alpine tundra above timberline on the eastern third of the road corridor, and subalpine and montane forests throughout the western section of the road corridor. Wet meadows are present along drainages and below snowfields and seeps at all elevations. Upland mountain meadows are present along the Little Bear Creek drainage and in scattered pockets within the forest. Shrub/grasslands are found at lower elevations on the western end of the project area. The distribution of the vegetation types in the project area is described in a report entitled *Final Report, Vegetation, Timber, and Old Growth Forest* (ERO 2001a).

Wetlands and Other Waters of the U.S.

Jurisdictional wetlands were delineated according to the U.S. Army Corps of Engineers Wetland Delineation Manual (Corps 1987) and guidance from the Corps Wyoming Regulatory Office (Corps 1996). The delineation identified about 49 ha (122 ac.) of wetlands in the project area. Detailed information about wetlands, other waters of the U.S., wetland functions and values, and methods for the wetland delineation can be found in the *Final Report, Wetlands, Waters of the U.S., and Riparian Areas* (ERO 2001b). The Corps reviewed and approved the wetland and waters of the U.S. delineation (Bilodeau 2001).

Wetlands and waters of the U.S. are common throughout the project area. All wetlands in the project area are classified as palustrine systems under the Cowardin classification system (1979). Wetlands in the palustrine system include vegetated wetlands traditionally called marshes, swamps, fens and wet meadows, as well as shallow water bodies and the shoreline vegetation of rivers, lakes and streams. Types of wetlands that occur in the project area include: emergent wetlands dominated by grasses, sedges, and rushes; scrub/shrub wetlands dominated by shrub species such as willows; and fens.

Wetland functions and values in the project area were evaluated using the Montana Wetland Field Evaluation Form and Instructions (Montana Department of Transportation 1996). Methods and results are described in the document entitled *Final Report, Wetlands, Waters of the U.S., and Riparian Areas* (ERO 2001b). Most wetlands in the project area, such as palustrine persistent emergent and palustrine scrub/ shrub, were rated high for the following functions:

- Ground water discharge/recharge
- Production export and food chain support
- General wildlife habitat

Wetlands that occur along streams or lakes, which account for about half of the wetlands evaluated, were rated high for:

- General fish/aquatic habitat (where applicable)
- Recreation/education potential
- Dynamic surface water storage

Other functions for which some wetlands were rated high include sediment/shoreline stabilization and uniqueness. The functions of flood attenuation/storage and sediment/nutrient/toxicant removal were rated either moderate or low, or were not applicable to certain types of wetlands.

Threatened or Endangered Species

The U.S. Fish and Wildlife Service (Service) identified three federally listed threatened or endangered species, one non-essential experimental species population, and two candidate species as having habitat in the project area (Table 1). The project area does not provide suitable habitat for four species of concern in Wyoming: the whooping crane (endangered); black-footed ferret (endangered); mountain plover (proposed); or yellow-billed cuckoo (candidate) (Service 2001). A more detailed description of threatened or endangered species is found in the *Final Report, Wildlife Resources* (ERO 2000).

The FHWA has submitted a Biological Assessment (BA) to the Service. Based on the analysis in the BA, the proposed project is likely to adversely affect the grizzly bear by increasing the risk of mortality from animal-vehicle collisions. Based on the same

Table 1. Threatened or endangered wildlife species with habitat in the project area.

Common Name	Scientific Name	Species Status	Record of Presence In or Near the Project area
Grizzly bear	*Ursus arctos horribilis*	Threatened	✓
Canada lynx	*Felis lynx canadensis*	Threatened	✓
Bald eagle	*Haliaeetus leucocephalus*	Threatened	
Rocky Mountain gray wolf	*Canis lupus irremotus*	Non-essential experimental	✓
Arctic grayling[†]	*Thymallus arcticus*	Candidate	
Western boreal toad	*Bufo boreas boreas*	Candidate	

[†]Only the fluvial population is a candidate for federal listing.
Source: Service 2001.

analysis, the proposed project is not likely to adversely affect the lynx or bald eagle, and is not likely to jeopardize the gray wolf.

Mitigation and conservation measures suggested by the Service during informal consultation have been incorporated into all build alternatives to minimize potential impacts on wildlife and threatened, endangered, and sensitive species. These measures will be refined in cooperation with the FHWA, SNF, Wyoming Game and Fish Department, and Service during final project design. Mitigation measures proposed for threatened and endangered species are described in the BA, and include habitat restoration, enhancement of wildlife crossings, and design of project features such as bridges to minimize impacts to wildlife. Final project requirements for mitigation will be developed during formal Section 7 consultation with the Service. The FHWA anticipates the Service will issue a Biological Opinion on the proposed project before the Record of Decision is issued.

Cultural Resources

Six resources determined to be eligible for listing on the National Register of Historic Places are found in the project area. Segment 4 of the Beartooth Highway and four bridges are historic resources found in the project area. In addition, the Lake Creek bridge, west of segment 4, will be used as a cultural resource mitigation site and is also eligible for listing. All build alternatives will adversely affect the road and bridges by altering the footprint and location of the roadway, and removing four historic bridges. Using the Lake Creek bridge as a mitigation site will not adversely affect it. The overall character of the bridges and culvert headwalls will be retained by salvage and reuse of original materials if possible. The characteristics of setting, feeling, association, and location of the switchbacks will be preserved in the preferred alternative. The FHWA is developing a Memorandum of Agreement with the Wyoming State Historic Preservation Officer that describes a plan to mitigate the adverse effects on the six eligible resources.

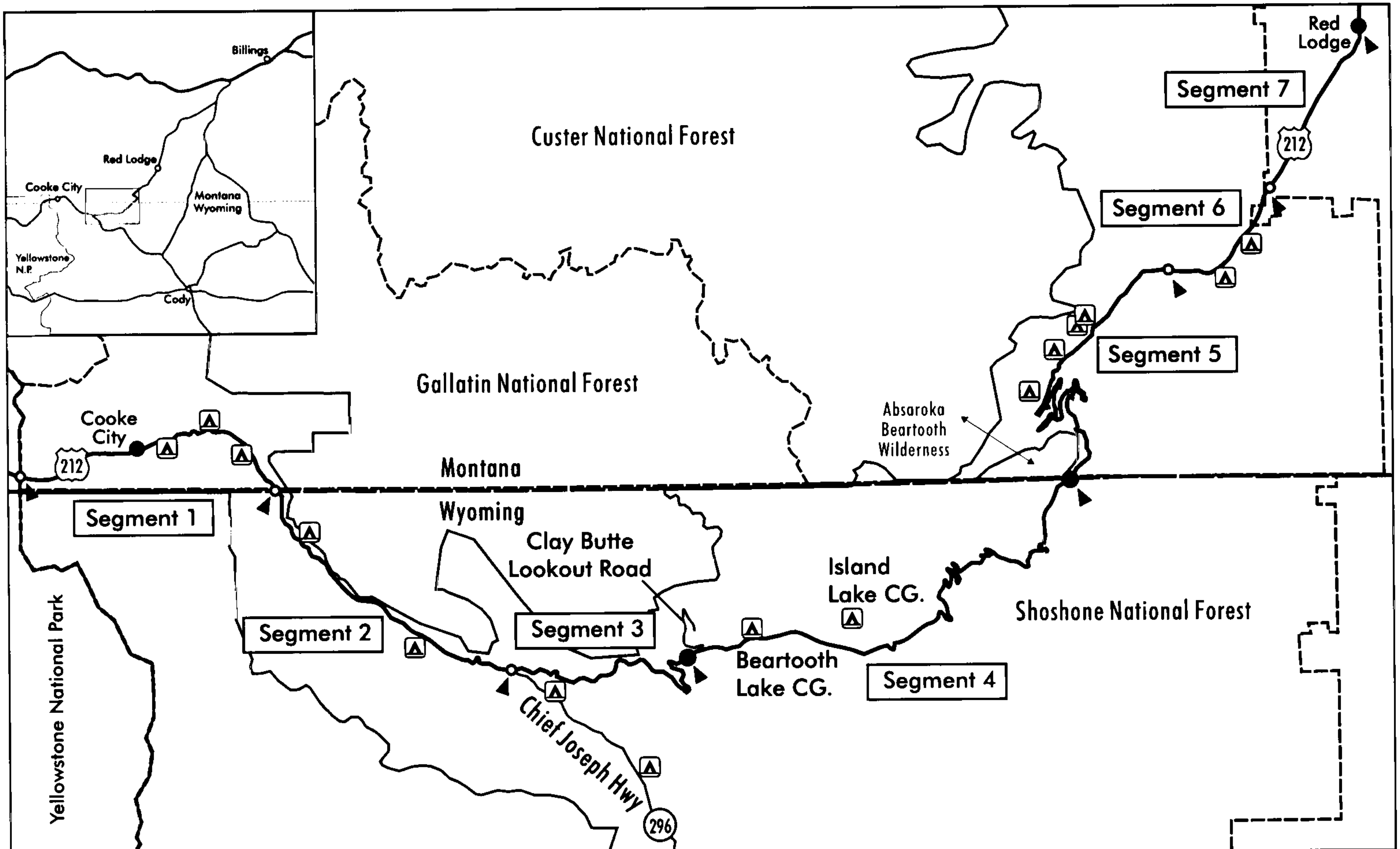
Project Description

In the proposed action, the FHWA, in cooperation with the SNF and the NPS, proposes to reconstruct a 30-km (18-mi.) section of U.S. 212 in Park County, Wyoming.

The proposed project will begin at kilometer post (KP) 39.5, just west of the Clay Butte Lookout turnoff, traverse east over Beartooth Pass, and end at the Montana/Wyoming state line at KP 69.4 (Figure 1). The majority of the reconstruction will be along the existing road corridor with an improved alignment, grade, and width to guidelines adopted by the FHWA and the Wyoming Department of Transportation (WYDOT), as required by FHWA's regulations (23 CFR 625). These regulations require that federally funded roads not on the National Highway System, such as the Beartooth Highway (U.S. 212), be designed, constructed, and maintained to the standards of the state in which they are located. The project was initially funded as part of the Crown Butte Mine settlement (the 1998 Department of the Interior and Related Agencies Appropriation Act); subsequently it was established as a High Priority Project in the Transportation Efficiency Act for the 21st Century.

In 1994, the FHWA evaluated the condition and repair needs of the Beartooth Highway from Red Lodge, Montana to Yellowstone National Park (YNP) (FHWA 1994). The evaluation was completed at the request of NPS in response to the road's deteriorating condition and the NPS' lack of authority and funding to reconstruct a road outside the YNP boundaries. The road was divided into seven segments for study purposes. The segment between KP 39.5, just west of the Clay Butte Lookout turnoff and the Montana/Wyoming state line at KP 69.4, was designated as segment 4. This permit application addresses segment 4, the segment proposed for reconstruction. The report concluded:

> "Segment 4 clearly has the worst conditions of any portion of the route. The narrow width of the road is a major deficiency, but the conditions of the surface, inadequate subsurface drainage, lack of adequate roadside ditches and culverts, substandard signing and guardrail, lack of defined roadside pullouts, lack of snow storage area, and increasing bicycle use all indicate that serious consideration should be given to upgrading the road" (FHWA 1994).



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- Segment 4 of the Beartooth Highway
- Project Start and End
- Other segments of the Beartooth Highway
- Forest Boundary
- Existing Forest Service campground

Source: 1:100,000 BLM topographic maps

N

1 Inch = 4 Miles

Figure 1
Project Location

521-wetFigure1.cdr

KP 39.5 and KP 69.4 are logical ends or termini for the project because the Beartooth Highway has been reconstructed up to both ends of the proposed project. Phase I of the proposed reconstruction (west of the Clay Butte Lookout turnoff to the road closure gate) will begin in 2005 and be completed in 2007. Phase II of the proposed project (road closure gate to Montana/Wyoming state line) will begin in 2008 and is estimated to be complete in 2010.

The project will include:

- Constructing a new road surface composed of crushed aggregate base and asphalt concrete pavement
- Installing adequate drainage structures
- Installing sub-surface drainage features and subgrade stabilization measures
- Widening the road to accommodate current and projected vehicular and recreational use and necessary maintenance activities
- Replacing existing historic bridges and building new bridges
- Improving parking areas, pullouts and access road intersections adjacent to the road
- Upgrading signs, striping, guardrails, and other safety-related features
- Implementing environmental commitments to reduce or mitigate environmental impacts

In areas where the proposed reconstructed road will cross wetlands, subexcavating and placing rock in the subexcavated area before placing the roadway embankment is proposed. This will allow water to pass freely under the road, maintaining the hydrology of the wetlands. Fill material will be placed in wetlands, streams, and lakes for embankment construction to support the roadway, retaining walls, and bridge abutments. The type of materials that will be placed in wetlands is discussed in Block 21. Construction techniques will follow commonly accepted highway construction practices.

The road will be reconstructed generally along the existing corridor. Several sections will be realigned to avoid or minimize wetland or other environmental effects or to enhance safety. The road will be reconstructed only wide enough to accommodate current and projected vehicular and recreational use, and necessary future maintenance activities. Major intersections, such as campground turnoffs, will be upgraded to improve sight distance and turning radii where needed. The reconstructed road surface will have a design life of 20 years, and structural elements, such as retaining walls and bridges, will have a design life of 75 years. The project also will include:

- Developing material sources to be used in the reconstruction and possible future maintenance
- Using National Forest lands for storing materials and staging equipment (called staging areas)
- Using roads outside the project area for transporting materials
- Using National Forest lands for work crew accommodations and offices near the project site

Roadway Cross Sections

Most of the road will be reconstructed using the typical section (Figure 2). The paved roadway will be either 8.4 m (28 ft.), 9.0 m (30 ft.), or 9.6 m (32 ft.), depending on the location. In the typical section, the ditches will not be paved, but will be graded to control runoff. The ditches will be 1.8 m (6 ft.) wide beyond the surfaced foreslope on a slope of 1:6 or 1:8 (vertical:horizontal), depending on the structural section thickness. Ditches will be constructed of native soil material and will be revegetated.

In the typical section, the foreslope would be 2.4-m (8-ft.) wide, with a varying slope ratio. Foreslope construction would be required in all areas without a paved ditch. Where paved ditches are proposed, a foreslope would not be required, reducing construction impacts. In guardrail areas, a steeper foreslope (typically 1:2) is proposed to minimize impacts because a barrier (guardrail) would prevent errant vehicles from leaving the road.

Two other sections, paved ditch and retaining wall, will be used at selected locations where warranted. Paved ditches will be used at locations where they currently exist and where there is existing evidence of ditch erosion problems, or to minimize environmental impact. Paved ditches will be 1.5 m (5 ft.) wide beyond the roadway shoulder on a slope of 1:8 or 1:10. Steeper ditches than proposed would reduce ditch capacity and may result in flows overtopping the ditch.

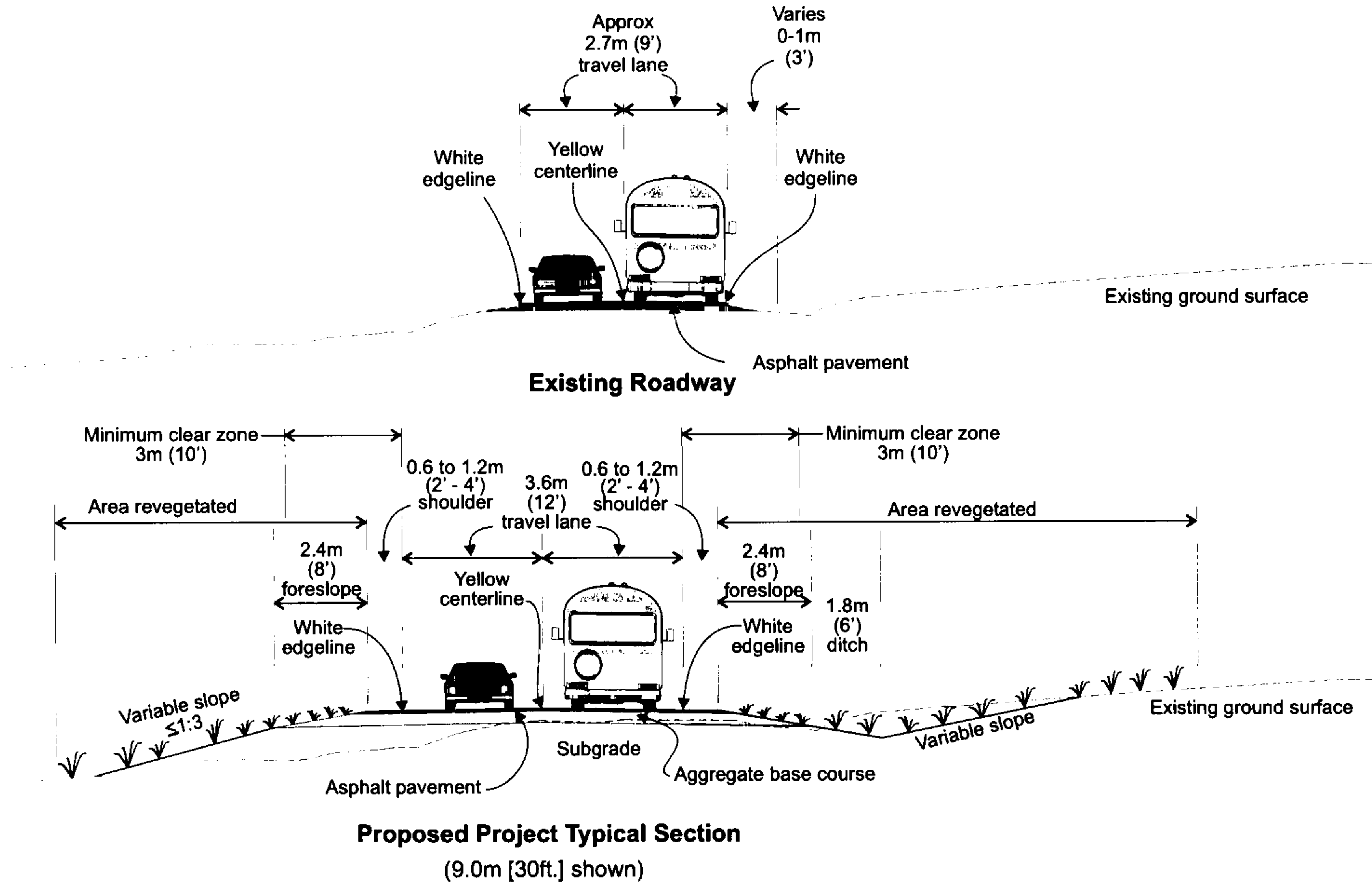

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Figure 2
Typical Cross Section of Existing and Proposed Road

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July 2003

In steep fill, retaining wall, or other hazardous locations, a guardrail section (Figure 3) will be used to prevent errant vehicles from leaving the road. Guardrails will be placed on the fill side 0.6 m (2 ft.) from the shoulder's edge.

A retaining wall section will be used where it will be necessary to elevate or widen the road and a fill slope, as shown in the typical section, will not be used (Figure 4). Final retaining wall types will be determined during final design, using guidelines developed in cooperation with the SEE team.

At the Little Bear Lake fen, the road will be constructed on piers or pilings built within the existing road footprint (Figure 5). The fill adjacent to the retaining walls would be removed if possible and restored to a wetland.

Avoidance and Minimization of Wetland Impacts

In developing the preliminary design upon which this permit application is based, the FHWA used environmental resource information and mapping of features such as wetlands, fens, and wildlife crossings to shift the alignment or to modify the roadway design to avoid and minimize impacts. The FHWA held numerous field reviews with the cooperating and regulatory agencies to review and modify the alternative alignments and roadway design. The proposed build alternatives are the result of several iterations of design refinements based on the resource information and mapping and field reviews. For example, all identified wildlife crossings were reviewed in the field, and changes to the fill slope, guardrail and other roadway elements were made to better accommodate and enhance existing animal crossings.

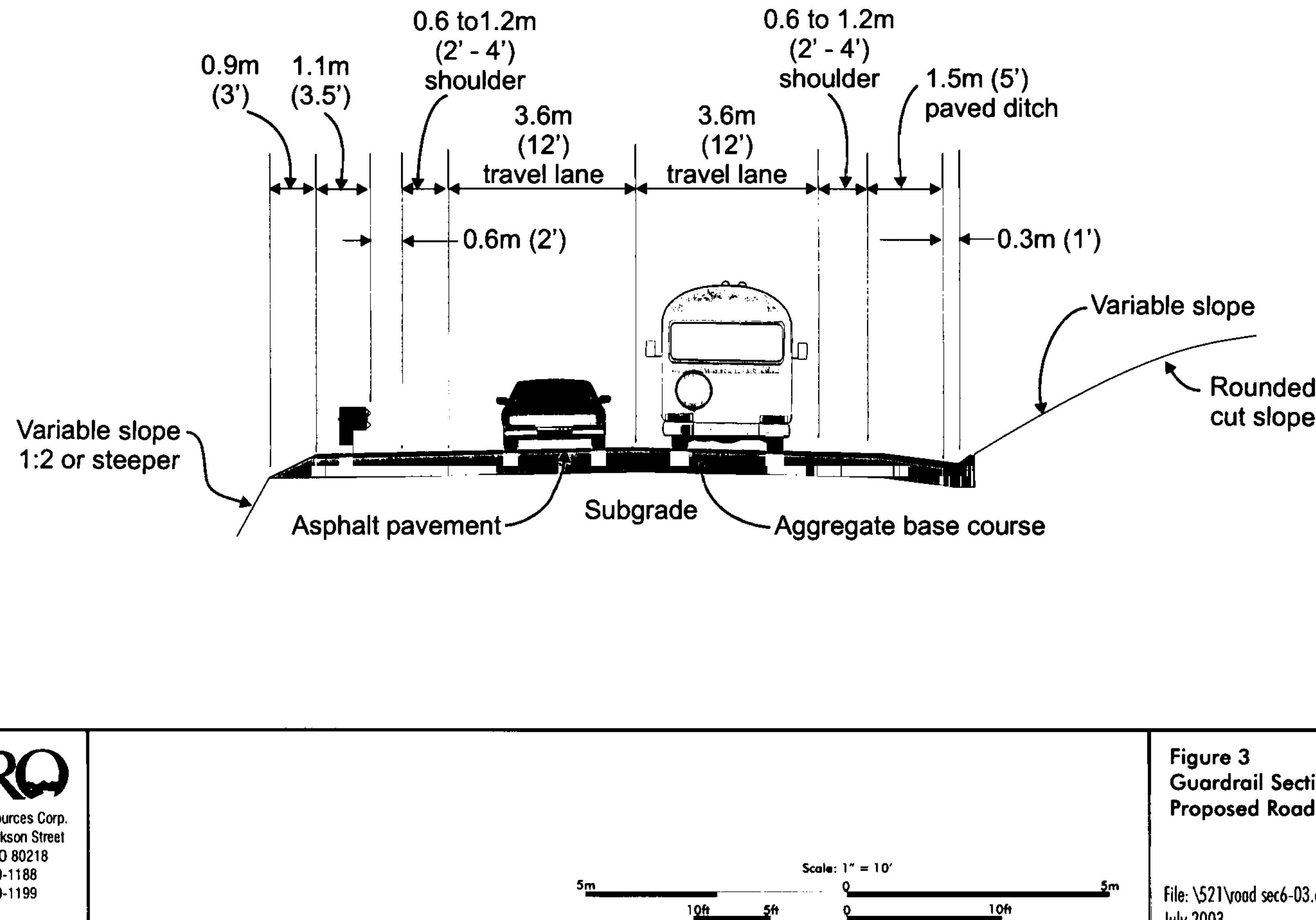

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Figure 3
Guardrail Section of
Proposed Road

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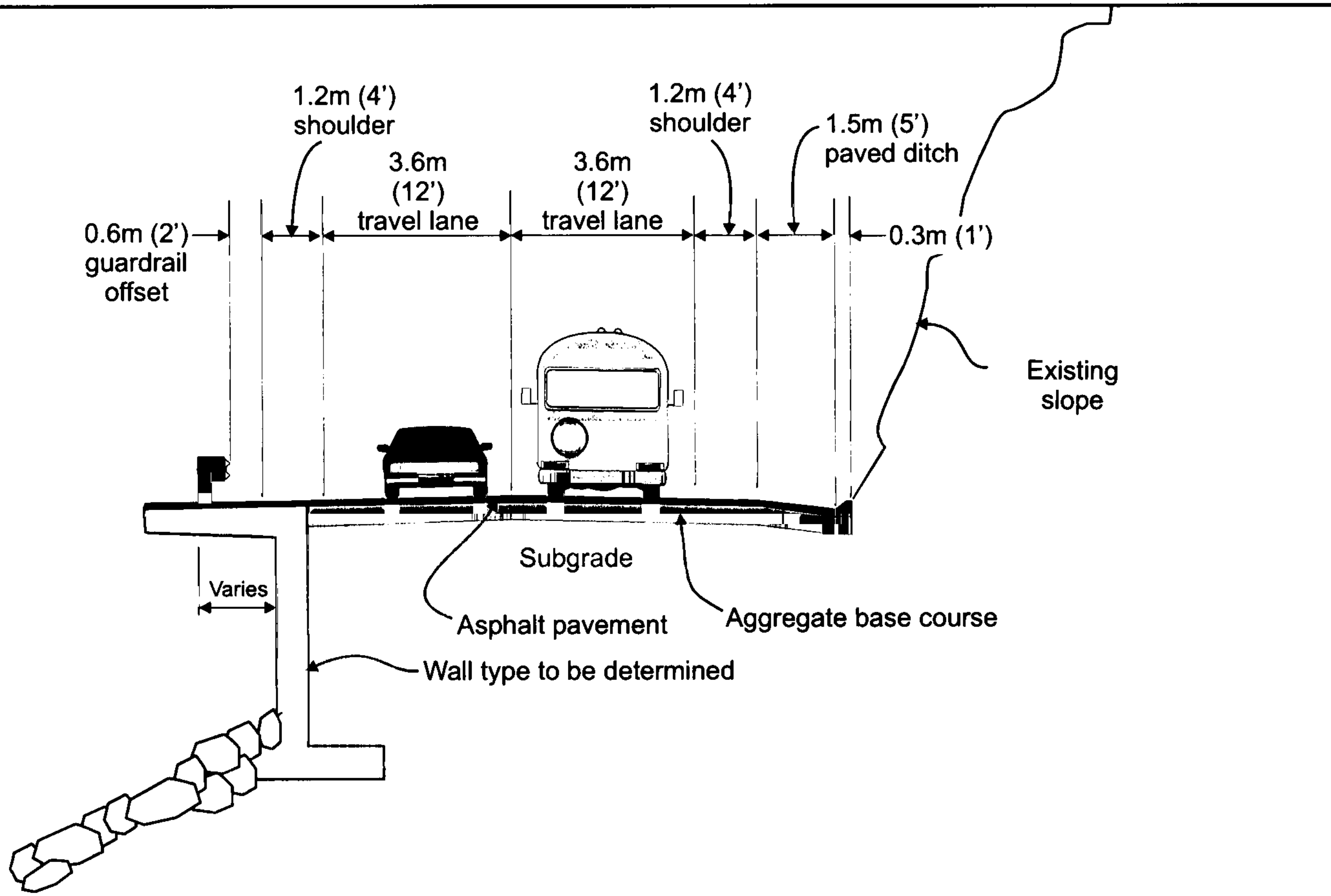

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Figure 4
Retaining Wall Section of Proposed Road

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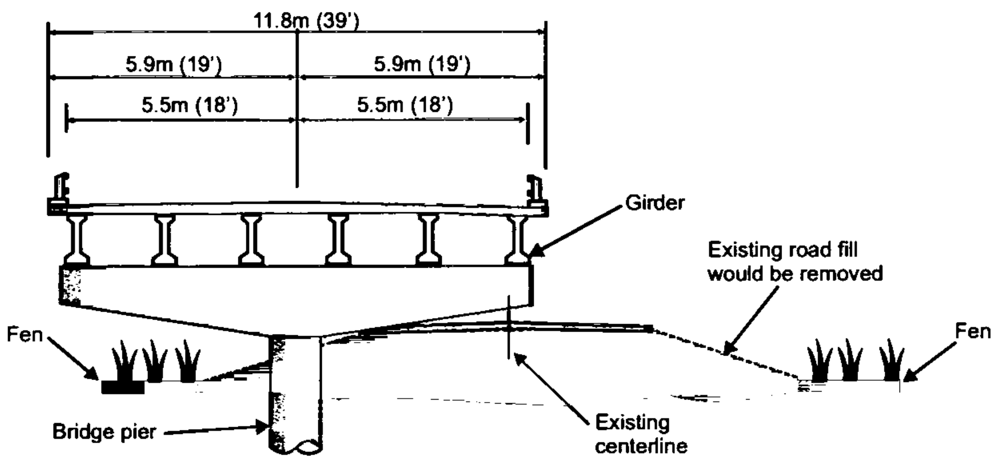

Bridge Option - Preferred

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Note: Proposed bridge design is preliminary and may change during final design.

Figure 5
Bridge Option Section at Little Bear Lake Fen

File: 521/IP/Figure5.cdr

The following avoidance and minimization techniques (illustrated in Figures 6 through 12, beginning on p. 18) have been applied to the extent possible at current level of design, and will continue to be applied as the project progresses to final design, to reduce environmental impacts:

- Shifting alignment to affect only one side of the road
- Using existing disturbed areas
- Reducing shoulder widths
- Using design criteria exceptions
- Using paved ditches
- Using retaining walls
- Using slope exceptions
- Reducing foreslope widths
- Adjusting pullouts and parking area locations

Shifting Alignment to Affect Only One Side of Road. The existing cut and fill slopes along the road have not been disturbed since the road was originally constructed in the 1930s. In most locations, the slopes have successfully revegetated, providing slope stability and reducing wind and water erosion. To avoid re-disturbing revegetated areas, the FHWA has designed the roadway so the disturbance is limited to one side of the road as much as possible (Figure 6). By affecting only one side of the road, new disturbance will be minimized. At the current design stage, the technique of shifting the alignment to affect only one side of the road has been implemented on 38 percent, or 11.1 km (6.9 mi.) of roadway.

Using Existing Disturbed Areas. Another technique to minimize new disturbance is to shift the alignment to ensure the new road disturbance encompasses the entire existing road disturbance. Instead of creating a new disturbance on one side of the road, and leaving sections of the existing disturbance unaffected, the road alignment will be shifted to include the entire existing disturbance (Figure 7). At the current design stage, the technique of shifting the alignment to use existing disturbed areas was implemented on 52 percent, or 14.9 km (9.29 mi.) of roadway.

Reducing Shoulder Width. The proposed shoulder widths were minimized on all sections to reduce the environmental impact. AASHTO recommends a 1.8 m (6 ft.) shoulder width. The proposed shoulders were reduced to 0.9 m (3 ft.) from the Clay Butte turnoff to the road closure gate, a distance of about 12 km (7.5 mi). From the road closure gate east to the Montana/Wyoming state line, the shoulder widths were reduced to 0.6 m (2 ft.), the minimum recommended width. This section of roadway is 16.7 km (10.4 mi) in length.

Using Design Criteria Exceptions. Design exceptions, such as in the standards for design speed and horizontal alignment, have been used in several areas of sensitive environmental concern to minimize disturbance. These areas include Beartooth Ravine, Frozen Lake, Bar Drift, Albright Curve and the switchbacks over Beartooth Pass.

Using Paved Ditches. Paved ditches are an effective way to reduce the amount of disturbance outside the footprint of the road. Paved ditches minimize impact by eliminating the foreslope and graded ditch and the associated cut (Figure 8). A paved ditch is used at locations where the ditch flow volumes or velocities are expected to be high, where there is existing evidence of ditch erosion problems, or where environmental impacts need to be minimized. For example, in the alpine section from the road closure gate to the Montana/Wyoming state line, paved ditches will be used about 58 percent of the time, based on preliminary design. Adding or removing paved ditches at specific locations will be considered during final design. Adding a paved ditch will increase the width of the paved surface, but will reduce the overall width of the construction impact. Conversely, removing paved ditch sections will reduce the paved surface width, but increase the overall width of the construction impact.

Using Retaining Walls. Retaining walls can reduce disturbance by minimizing cut or fill slope limits of disturbance. Two potential types of walls include mechanically stabilized earth (MSE) walls and rockery walls. Rockery walls consist of dry-laid rocks. The MSE walls could be constructed and faced with a fabricated material or constructed in such a manner that existing talus material could be used to cover the face of the wall. These two options are shown in Figure 9. Walls are very expensive relative to cut or fill slopes, and will be used only in locations with high resource values. The FHWA, in cooperation with the SEE team, will decide on appropriate architectural treatments to ensure the proposed walls blend into the terrain. These architectural treatments also will be discussed at future public meetings.

Using Slope Exceptions. In certain sensitive areas, it may be possible to steepen the cut or fill slopes (called slope exceptions), and thereby the width of impact, for short stretches of the roadway (Figure 10). For example, a fill slope that is 4 m (13 ft.) high and has a slope ratio of 1:4 extends out 16 m (52 ft.). If the proposed slope were steepened to 1:3 on the same 4 m (13 ft.) high slope, the fill slope would extend out 12 m (39 ft.). Slope ratios are carefully selected based on the ability for errant vehicles to get back to the roadway and an analysis of the material of which they are constructed. Flatter slopes have safety, erosion control, and revegetation advantages over a steeper slopes so slope exceptions would only be used at environmentally sensitive locations, and would be implemented during final design.

Reducing Foreslope Widths. The proposed foreslope is a fixed width of 2.4 m (8 ft.) with varying slope ratios. This width would accommodate a future overlay without re-disturbing the foreslope in most locations, provide a recoverable slope, and provide a clear recovery area. Making the foreslope narrower increases its steepness and minimizes impacts. As noted in the previous discussion, however, steeper slopes are less safe, are more likely to erode, and revegetate more slowly than flatter slopes. In those areas where the existing undisturbed ground is relatively flat so that the safety clear zone is not compromised with a steepened foreslope, further adjustments to the foreslope ratios would be reviewed (Figure 11).

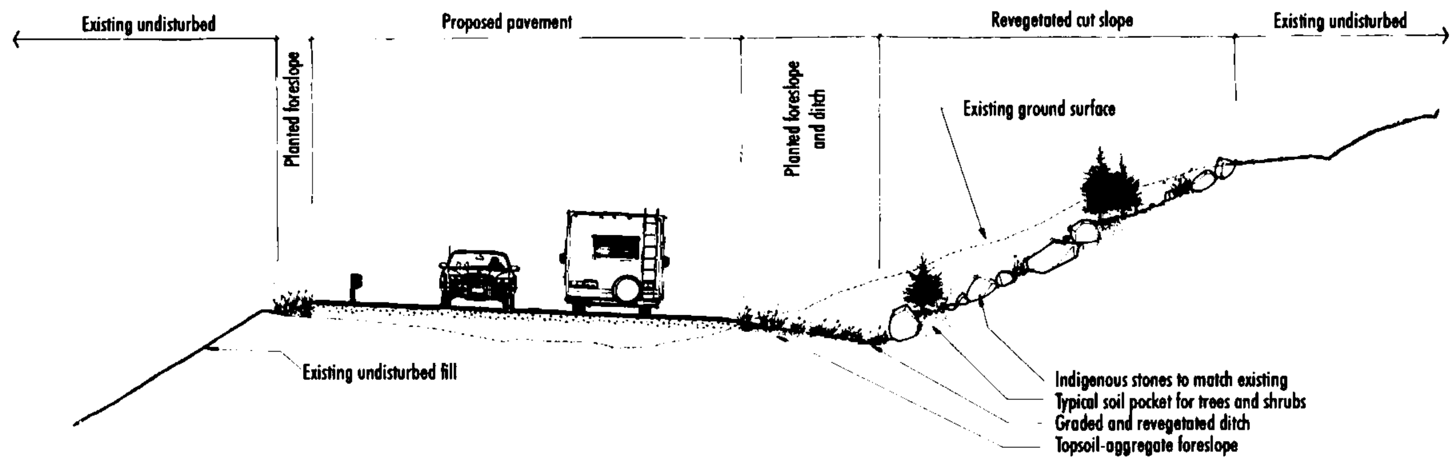
Adjusting Pullout and Parking Area Locations. The FHWA and the SNF have worked extensively to identify the most appropriate places for pullout and parking areas. These facilities provide the traveler with an opportunity to stop and enjoy the road's spectacular scenery. To minimize impacts, the number of pullouts in all alternatives has been reduced. In completing the impact assessment described in Chapter 3, the FHWA used the footprint of the road as developed during preliminary design. The preliminary design did not include a detailed field review of all proposed pullout and parking areas. During subsequent design and field reviews, each pullout and parking area will be reviewed to ensure that no wetlands are affected by the additional disturbance associated with the pullout or parking area. An example of where a pullout will be eliminated in final design to avoid wetland impact is shown in Figure 12.

Mitigation

Proposed Strategy

In developing a wetland mitigation strategy, the FHWA followed the 404(b)(1) guidelines of 40 CFR 230, the Memorandum of Agreement between the COE and the EPA concerning wetland mitigation (Corps and EPA 1990), Federal Guidance on In-Lieu-Fee arrangements (Corps et al. 2000), and the Corps December 24, 2002 Regulatory Guidance Letter (Corps 2002). Mitigation for unavoidable impacts to wetlands involves two approaches: primarily avoidance and minimization of wetland impacts; and secondarily creation, restoration, and/or preservation of wetlands to compensate for unavoidable impacts on wetlands. Mitigation strategies were developed that meet the wetland mitigation goals for the project. Wetland mitigation is proposed at a 1:1 ratio, which will replace the functions and values of all disturbed wetlands.

The FHWA will mitigate all temporary impacts to wetlands. Best management practices, such as silt fencing and temporary soil tackifiers, will be used to help prevent erosion and siltation from construction activities. The WDEQ's BMPs designed to reduce or eliminate water quality degradation due to physical modifications of surface water will be used (WDEQ 1999). Wetlands that are temporarily impacted during construction will be regraded and revegetated to allow the re-establishment of wetlands. Seeding and planting of native wetland species will be described in the Final Wetland Mitigation Plan, which will be submitted to the Corps for its review and approval before construction.



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5m 0 5m

20ft 10ft 0 20ft

Figure 6
Minimizing New Impacts by Shifting Proposed Roadway Alignment

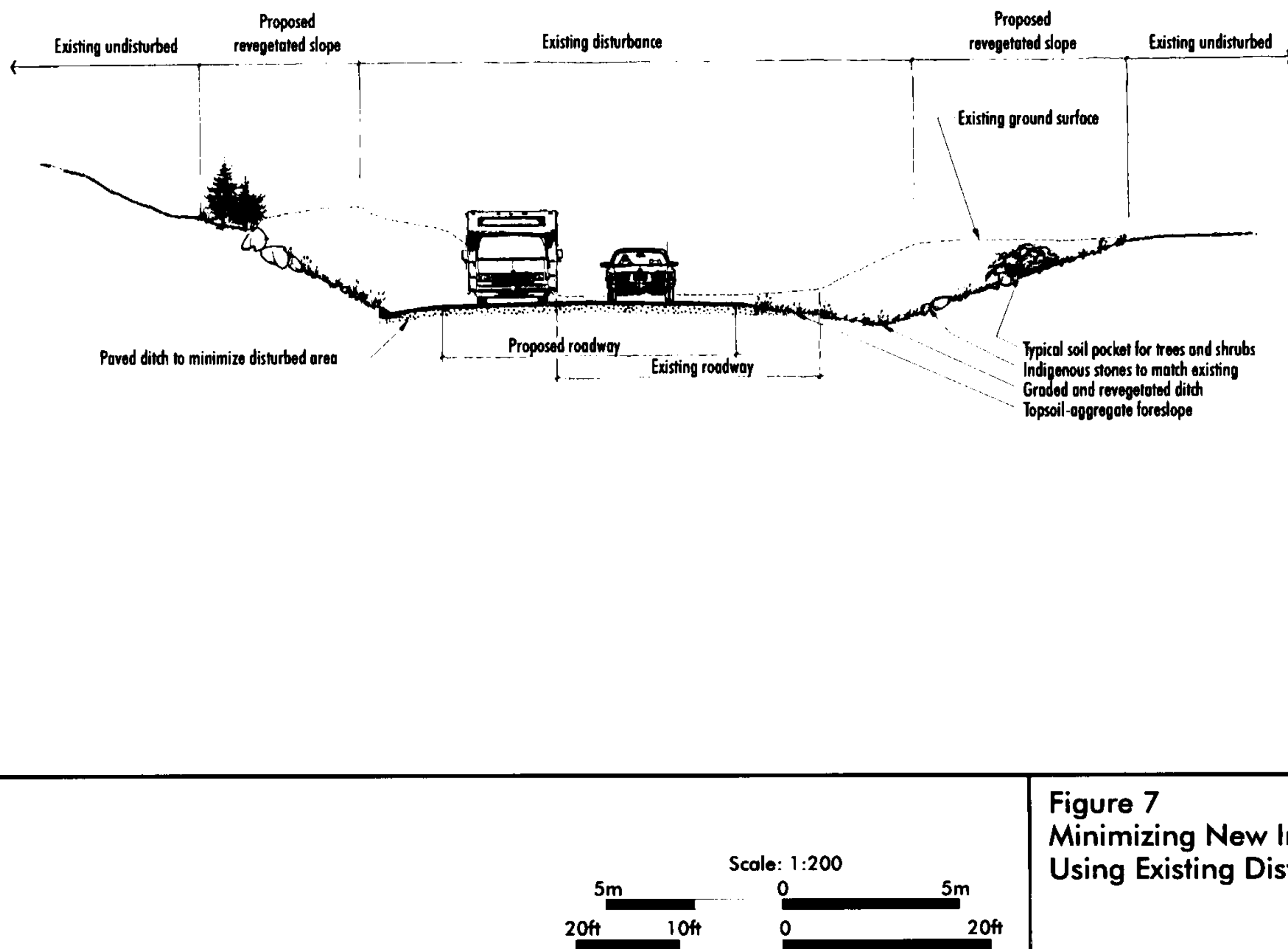

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Figure 7
Minimizing New Impacts by Using Existing Disturbance

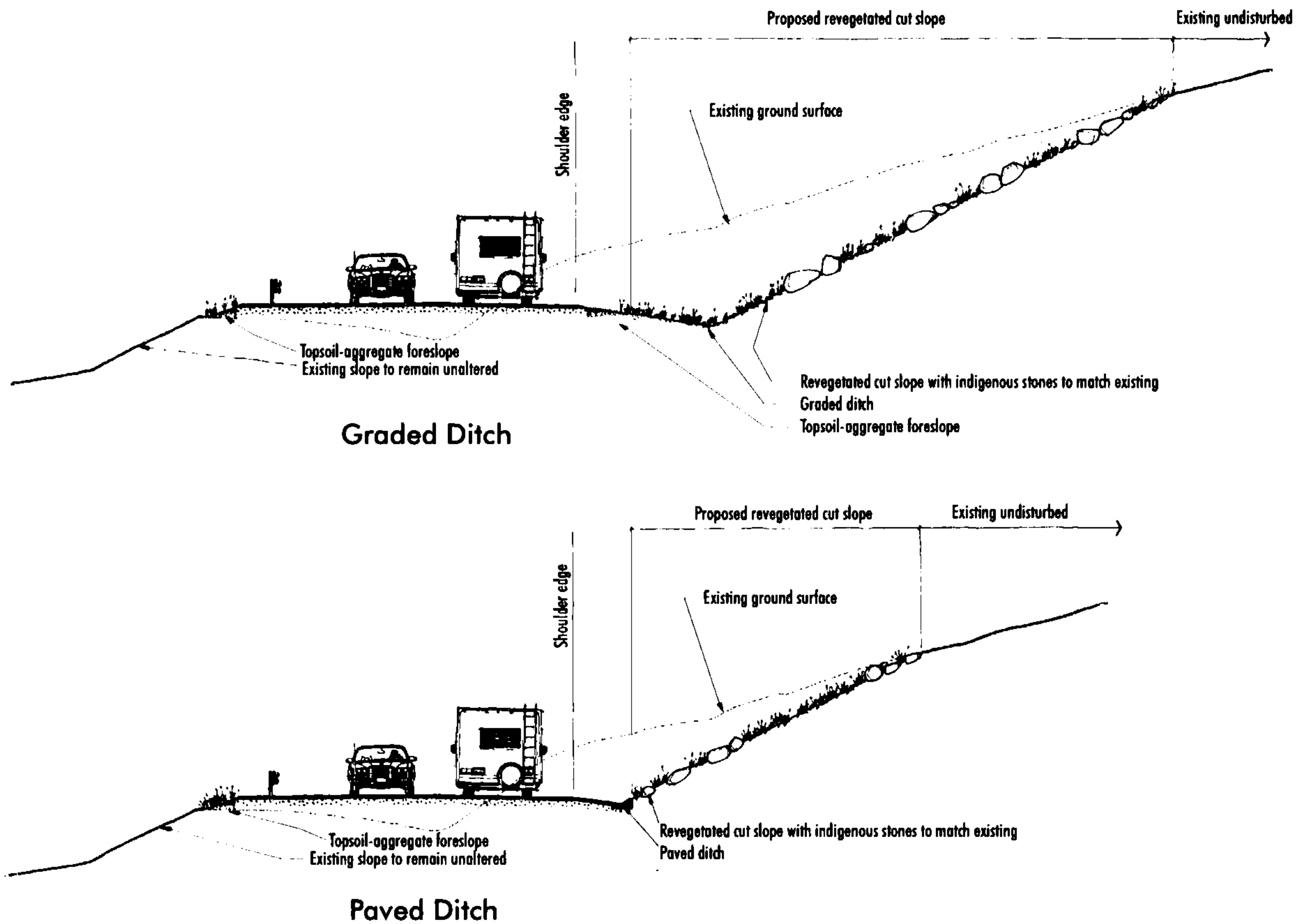

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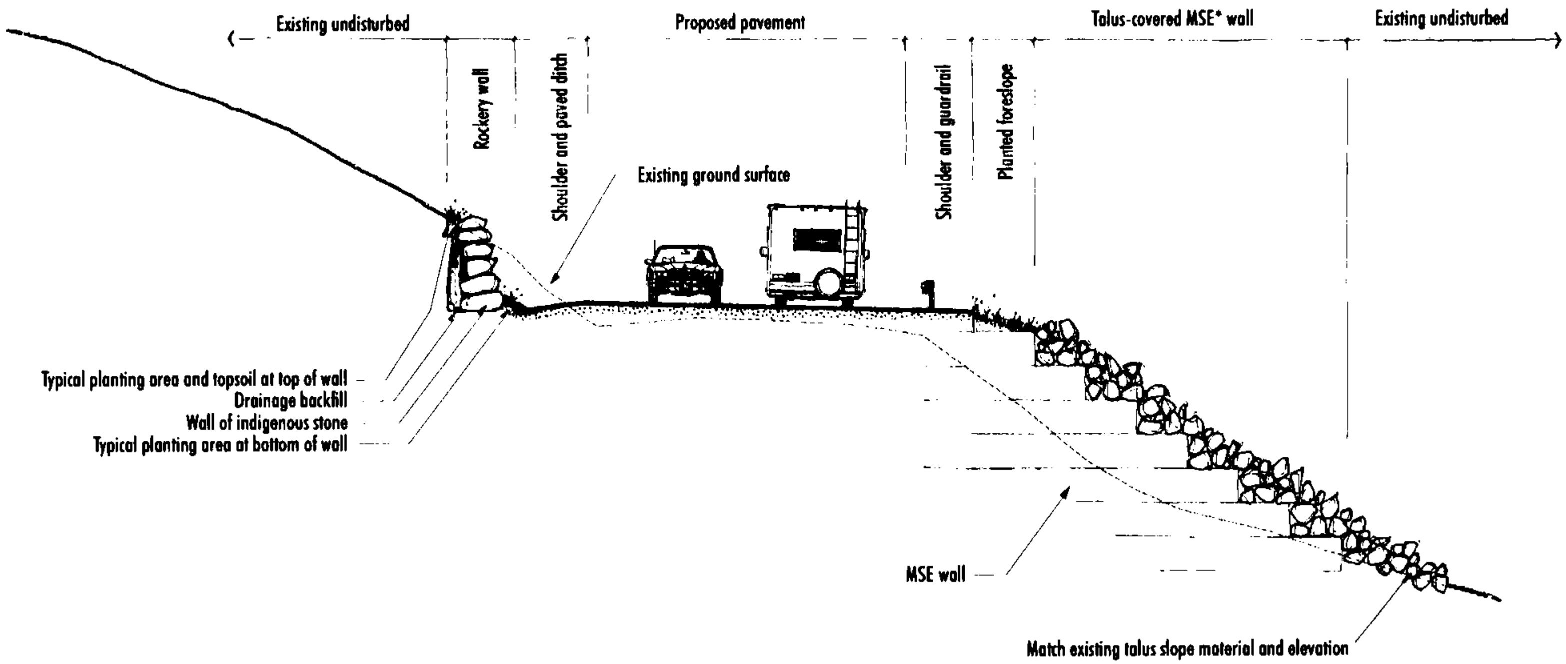
Figure 8
Difference in New Impacts between Paved and Graded Ditch Types



* MSE wall = Mechanically stabilized earth wall

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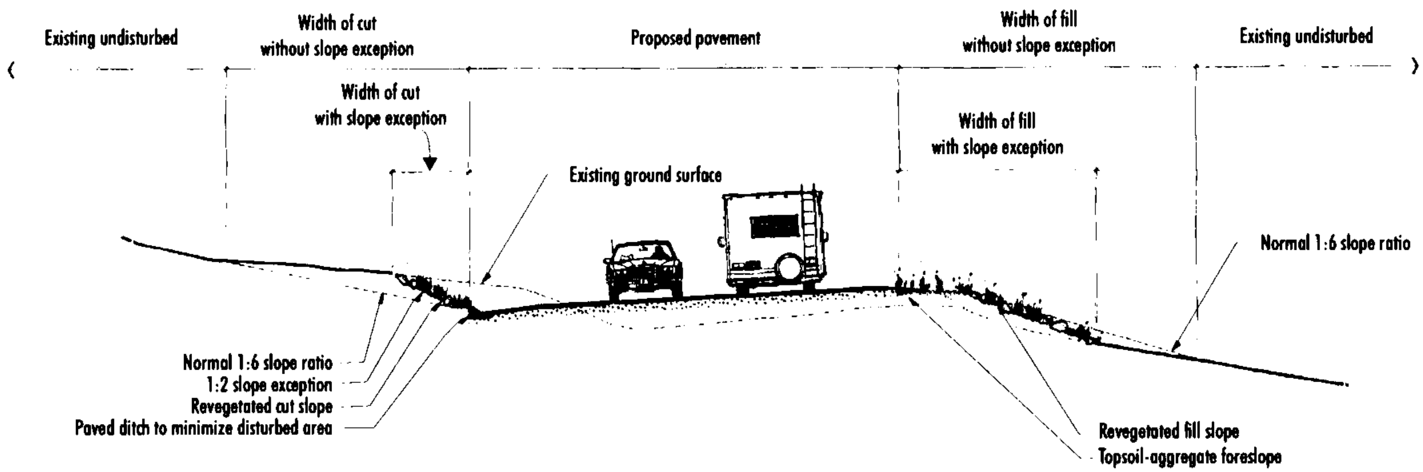
Figure 9
Minimizing New Impacts by Using Various Wall Types



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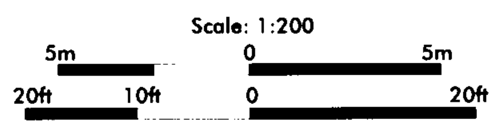
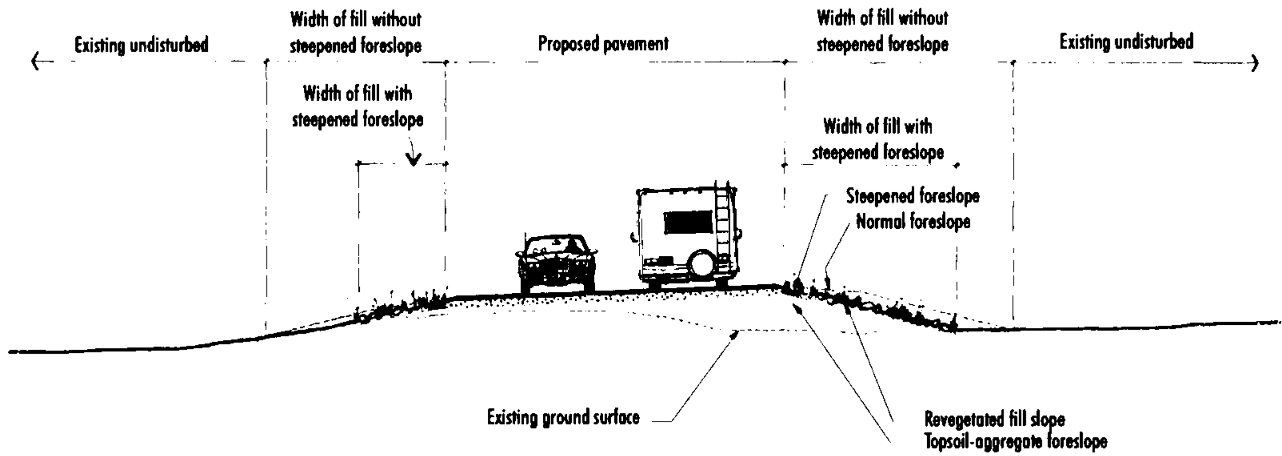


Figure 10
Minimizing New Impacts by
Using Slope Exceptions



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20ft 10ft 0 20ft

Figure 11
Minimizing New Impacts by Adjusting Foreslope Widths

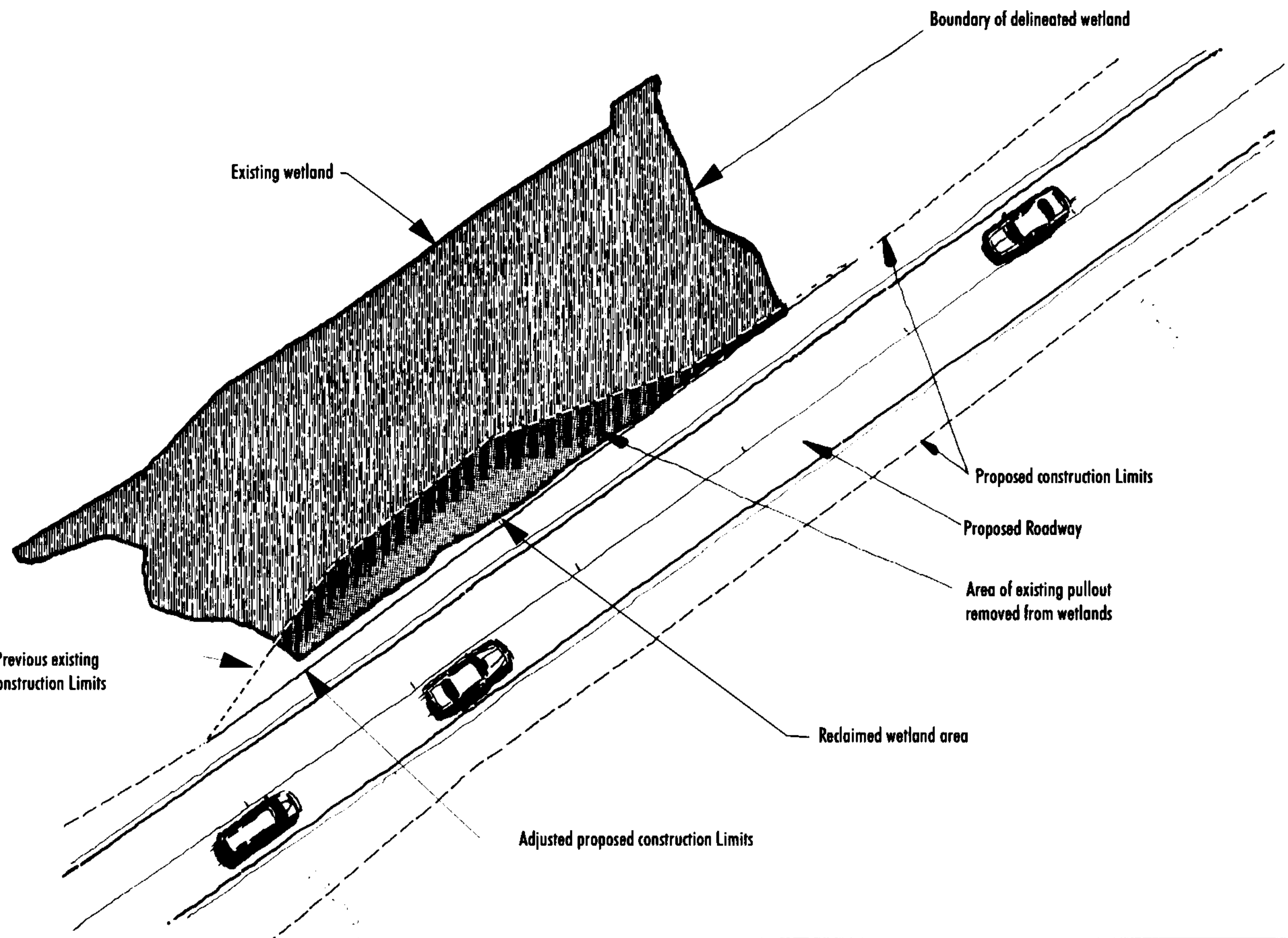

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Figure 12
Minimizing Impacts to Sensitive Resources by Adjusting Pullout and Parking Locations

Wetland mitigation for unavoidable permanent wetland impacts is described in the *Conceptual Wetland Mitigation Plan* (ERO 2002). As currently proposed, wetland mitigation will involve both on- and off-site mitigation. In developing the plan, opportunities were considered in the following order:

- On-site wetland restoration
- On-site wetland creation
- Off-site wetland creation
- Off-site wetland preservation and restoration

On-site mitigation opportunities will consist of wetland and fen restoration, with some wetland creation. The FHWA surveyed the project area to locate suitable on-site wetland mitigation opportunities in the same environments in which impacts will occur under the build alternatives. These opportunities were reviewed in the field with representatives from the SNF, the Environmental Protection Agency (EPA), and the Corps. Because most potential on-site wetland creation opportunities will involve impacts to existing, high quality meadows, large wetland creation sites were eliminated from further consideration (ERO 2002). For example, in alpine sections of the project site, impacts to alpine vegetation that will result from construction of a mitigation wetland outweigh the value of the constructed wetland. Consequently, no alpine wetland mitigation opportunities were identified and all on-site wetland restoration and creation will take place in subalpine areas. On-site wetland mitigation is possible at ten sites located in the Top of the World Store area, at the Little Bear Lake fen, at Long Lake, and at an abandoned gravel pit in the Frozen Lake area. Species native to the area will be used for all seeding and planting of restored and created wetlands. Wetland topsoil salvaged from impacted wetland areas will be used to the greatest extent practicable.

For on-site mitigation, the FHWA proposes restoration with small areas of on-site creation, totaling 1.5 hectares (3.6 acres) (Table 2). Included in this acreage is about 0.16 ha (0.4 ac.) of fen restoration at the Little Bear Lake fen. At the Little Bear Lake fen, the road has been constructed on fill placed in the fen. A bridge is proposed at this site, and

Table 2. On-site wetland mitigation.

Type of Site	Available Area		Probable Mitigation Area†	
	ha	ac.	ha	ac.
Restoration (90% success factor)	1.2	3.0	1.1	2.7
High Priority Creation (90% success factor)	0.4	1.0	0.4	0.9
Total	1.6	4.0	1.5	3.6

†Success factor applied to available area.

fill associated with the existing road would be removed. The remaining compensatory wetland mitigation will be in the form of off-site preservation and restoration.

Although restoration of wetlands will be possible in most of the build alternatives, the area available for restoration and small areas of creation will not be large enough to fully compensate for the impacts of the build alternatives. Creation of new wetlands on-site beyond that proposed will disturb existing vegetation communities, increasing the total project impacts.

After developing all appropriate on-site mitigation, the FHWA investigated wetland mitigation banking. No wetland mitigation banks are located in the area, however, and no suitable wetland mitigation credits are available in Wyoming for this project (DiRienzo 2002).

The FHWA investigated off-site wetland mitigation at the Pilot Creek gravel pit. Off-site wetland creation at this location originally was considered a low priority because of the deep depth to ground water. However, during the spring of 2003, high flows from Pilot Creek flowed into the gravel pit. The FHWA is examining the possibility of creating wetlands using high flows from Pilot Creek. The FHWA estimates that between 0.4 and 1.2 ha (1 and 3 ac.) could be created at the site. Wetland creation at the site would likely be surrounded by a large area (up to 4 ha (10 ac.)) of upland and riparian restoration, so diverse habitats would be incorporated into the mitigation site design. No other off-site wetland creation opportunities were found near the project area.

Following a thorough examination of all wetland restoration and creation possibilities, opportunities for off-site preservation and protection of wetlands were investigated to mitigate for wetland impacts from the project. The FHWA considered off-site preservation and protection for compensatory wetland mitigation because other wetland mitigation opportunities were insufficient to mitigate all impacts. The Corps recognizes preservation as an important type of compensatory wetland mitigation as a means of obtaining the goal of no net loss of wetlands (Corps 2002).

The FHWA identified opportunities for off-site preservation wetlands adjacent to a stream that flows into YNP, and possibly in areas between the divide between Soda Butte Creek and the Clarks Fork Yellowstone River. These locations are being considered because they contain valuable habitat, such as wetlands dominated by extensive stands of willows, and the land has been subdivided for development. The preferred off-site preservation site contains willow assemblages consisting of palustrine scrub/shrub and persistent emergent wetlands that are uncommon in the YNP area. These willow assemblages provide valuable habitat for species such as moose, which rely on willow assemblages for winter browsing. The preferred off-site preservation site contains wolf willow, a Gallatin National Forest (GNF) sensitive species, and Farr willows (*Salix farriae*), a SNF sensitive species. The site is a high priority site for preservation because of the extensive willow communities present, the valuable wildlife habitat provided by the site, its proximity to YNP, and the land has been subdivided for development. The site also provides an opportunity for wetland restoration. Roads constructed through the site have filled wetlands. The roads could be removed and restored as wetlands. Table 3 shows the approximate area of land available at this possible off-site mitigation area.

Other potential off-site preservation sites provide scrub/shrub, emergent, and forested wetlands, riparian areas, and uplands. All potential off-site preservation sites are in areas that could be or have been subdivided, and receive development pressure.

Table 3. Area of existing wetlands, waters of the U.S., riparian areas, and upland areas in the preferred off-site preservation area.

Type of Area	ha	ac.
Wetland	2.44	6.02
Waters of the U.S.	0.88	2.17
Riparian	0.56	1.39
Upland	1.91	4.71
Total	5.79	14.29

In accordance with the Corps' December 24, 2002 Regulatory Guidance Letter (Corps 2002), compensatory wetland mitigation at the preferred off-site preservation considers the resource needs of the watershed, includes a mix of riparian, upland, and open water habitats, and is in an area about which two federal agencies, NPS and the GNF, have expressed concern. Because the preferred off-site preservation area includes valuable habitat, sensitive vegetation, and is threatened by development, it is ecologically more important than on-site wetland creation.

Replacement of Functions and Values

Most of the wetlands that will be affected by the project are palustrine scrub/shrub and palustrine persistent emergent wetlands in riverine and slope topographic positions. Therefore, the proposed compensatory mitigation plan consisting of on-site restoration and off-site preservation focuses on providing functions typically associated with riverine and sloped scrub/shrub and emergent wetlands, including (ERO 2002):

- Ground water recharge/discharge
- Production export and food chain support
- Dynamic surface water storage
- Flood attenuation/storage

The mitigation plan also replaces functions lost in other types of wetlands, including:

- General wildlife habitat
- General fish/aquatic habitat
- Sediment and shoreline stabilization
- Sediment/nutrient/toxicant removal

On-site restoration provides 1:1 replacement of wetland functions and values for several reasons. The wetlands proposed to be restored are in the same topographic position and drainage basin as the affected wetlands. Also, the wetland areas to be restored often are connected to or located near the wetlands proposed to be impacted, and have the same Cowardin classification (riverine scrub/shrub). Therefore, the restored wetlands will have the same functions and values as the impacted wetlands.

Off-site wetland creation at the Pilot Creek gravel pit provides 1:1 replacement of wetland functions and values. Wetlands that could be created at the Pilot Creek gravel pit would include areas of upland and riparian habitats, creating valuable wildlife habitat. Wetlands created at Pilot Creek likely would rate high for the following functions:

- General wildlife habitat
- Sediment/nutrient/toxicant removal
- Ground water discharge/recharge

Off-site preservation also provides 1:1 replacement of wetland functions and values. The preferred off-site wetland preservation site includes riverine scrub/shrub wetlands rated high for the following functions (ERO 2001c):

- General wildlife habitat
- General fish/aquatic habitat
- Sediment/nutrient/toxicant removal
- Sediment/shoreline stabilization
- Ground water discharge/recharge

The functions of the preferred off-site preservation site is comparable in quality to the functions of the wetlands proposed to be impacted by the proposed Beartooth Highway Reconstruction project because they: 1) are scarce in YNP and the GNF, 2) provide valuable wildlife habitat, 3) contain sensitive plant species, and 4) have been affected by past development and are susceptible to future development.

Block 19: Project Purpose

Segment 4 needs to be reconstructed to:

- Support management of National Forest lands adjacent to the road, including maintaining the Scenic Byway/All-American Road qualities
- Maintain an efficient transportation link between Red Lodge, Montana and Yellowstone National Park that safely accommodates projected traffic in 2025
- Provide a roadway that could be reasonably maintained in a sustainable manner by a maintaining agency

Needs Associated With Land Management Goals

Segment 4 of the Beartooth Highway traverses National Forest lands managed by the SNF. The SNF's Land and Resource Management Plan (also called the Forest Plan) established a forest-wide goal of managing activities along travel routes to maintain and enhance recreation and scenic values (SNF 1986). The Forest Plan also established Management Areas to guide management of the Forest. The Beartooth Highway corridor is in a Management Area that emphasizes rural and roaded natural recreation opportunities. Motorized and non-motorized recreation activities such as driving for pleasure, viewing scenery, picnicking, fishing, camping, hiking, snowmobiling, and cross-country skiing are emphasized.

The designation of sections of the road including Segment 4 as an All-American Road under FHWA's Scenic Byway Program indicates the road has one-of-a-kind features that do not exist elsewhere. The All-American Road segment has two intrinsic qualities of national significance—natural and scenic. As an All-American Road, it provides an exceptional traveling experience so recognized by travelers that they would make a drive along the highway a primary reason for their trip. A Corridor Management Plan has been prepared for the All-American Road sections of the road (Beartooth All-American Road Steering Committee 2002). The plan describes management and protection strategies, and provides recommendations for interpretation.

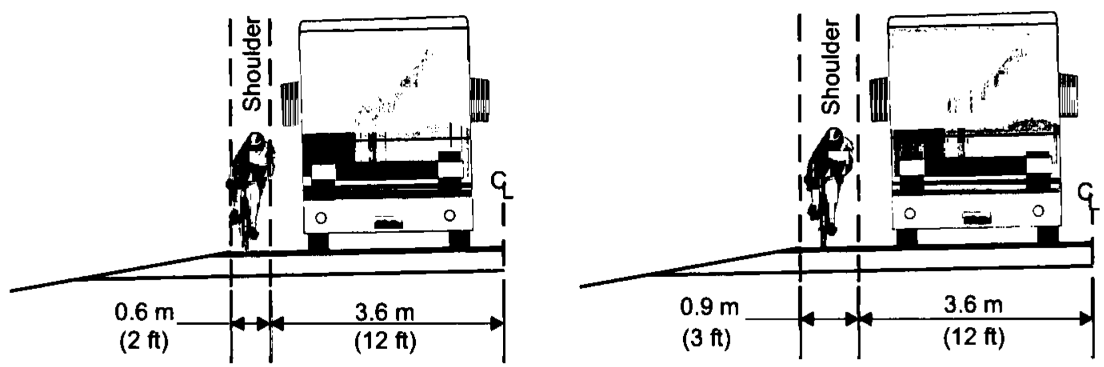
Although the entire road corridor is in the same Management Area, the SNF manages Segment 4 for two distinct types of road use. Many travelers come to the Beartooth Highway to experience the drive and continue on to destination communities or YNP. Other travelers come to the Beartooth Plateau as a recreation destination and either stay overnight or engage in day use of the area, with short trips to and from local roadside and off-road destinations. Winter use, from October through early June, is concentrated primarily on groomed snowmobile routes between Top of the World Store and Long Lake.

The SNF manages the section west of Long Lake as a recreation complex, with more intensive recreational activity, including pedestrian and bicycle use (Figure 13). All of the developed recreation sites along the road are found west of Long Lake. The two campgrounds along Segment 4, Beartooth Lake and Island Lake, are popular camping locations and provide access to area lakes. Wilderness trails originate at both campgrounds. Because of their proximity to the road, Beartooth Lake and Long Lake are frequent stopping spots for tourists. Top of the World Store, the only location offering supplies, is between Island Lake and Beartooth Lake. Several jeep trails, such as the Morrison Jeep trail and the Sawtooth Lake trail, originate between Long Lake and Island Lake. The road provides motorized and non-motorized access to the wilderness and jeep trails.

In the western section, travelers are more likely to park along the road shoulder, use bicycles, motorcycles and all-terrain vehicles in family groups, and engage in roadside viewing and related activities. These activities involve frequent stops, slow-moving motorized and non-motorized vehicles and a variety of user ages. To minimize environmental impact, the SNF, in cooperation with the FHWA and other SEE team members, agreed a 0.9-m (3-ft.) shoulder would meet the recreation use needs and adequately provide for safety from the Clay Butte Lookout turnoff to the road closure gate. A 1.2-m (4-ft.) shoulder will be used from the beginning of the project to the Clay Butte Lookout turnoff to provide a transition from the 1.2-m (4-ft.) shoulder on the adjoining segment to the west (Segment 3) to the 0.9-m (3-ft.) shoulder starting at the Clay Butte Lookout turnoff.

Winter recreational use also is important because the highway from Cooke City to Long Lake is a popular snowmobile destination. Low snow years and the “shoulder” seasons (early June and early October) of snowmobiling cause a mix of snow craft and full-size vehicles on sections of the road. A wider shoulder width would address the potential safety hazards of this vehicle mix.

East of Long Lake, the road enters the alpine zone where the dominant recreational activity is scenic driving and viewing. No campgrounds are present east of Long Lake, and the Forest Plan either prohibits or discourages off-road motorized activity.



ERO
ERO Resources Corp.
1842 Clarkson Street
Denver, CO 80218
(303) 830-1188
Fax: 830-1199

Scale: 1" = 10'

5m 0 5m
10ft 5ft 0 10ft

Figure 13
Bike Use on a 0.6m (2-ft) and 0.9m (3ft) Shoulder

File: 521-road sec6-03.cdr
July 2003

The incidence of family group activities, bicycles and road-side stops, and other day-use activities diminishes significantly east of Long Lake (SNF 2001). The steep terrain, lack of trees for shelter, steep road grade, lack of camping facilities and frequent, severe and cold weather at all times of the year limit road use primarily to driving and viewing. The SNF management goal is to discourage over-snow recreation east of Long Lake due to frequent hazardous weather events. Because of the more limited roadside activities in the eastern section of the project, there is less need for a wider shoulder.

Agency and public comment on the Draft EIS expressed concern about maintaining the road's All-American Scenic Byway qualities. The following attributes define these qualities:

- The curvilinear nature of the road, particularly the switchbacks in the alpine area
- The opportunity to stop and enjoy the spectacular scenery, pristine lakes and streams, and uncommon alpine vegetation and wildlife in a safe manner
- The proximity of the vegetation to the roadway, particularly in the alpine area

The proposed project needs to maintain the road's qualities, and where possible, improve the visitor experience of the road. For example, over the years, informal pullouts have developed along the road throughout the corridor. At numerous locations, poorly located pullouts endanger pedestrians and traveling vehicles, reducing the recreational benefits of driving for pleasure and viewing scenery. In some locations, visitor use away from the pullouts, such as near wetlands, fens, lakes, or alpine vegetation, has lead to environmental degradation. The proposed project needs to support SNF's management of the corridor with better-designed and located pullouts to meet recreational demand while at the same time reducing current environmental degradation in environmentally sensitive areas.

Needs Associated With Accommodating Projected Traffic

Segment 4 is an important transportation route between Red Lodge, Montana and YNP. The Beartooth Highway was initially constructed as a National Park Approach Road in the 1930s to provide access to YNP from Red Lodge. Since the road's opening in the 1930s, tourism associated with the Beartooth Highway has provided significant economic benefits to Red Lodge and Cooke City, Montana, as well as Cody, Wyoming. By safely accommodating projected traffic types and volumes, the tourism associated with the highway will continue to play a major role in sustaining these towns' economies.

Since Segment 4 was constructed in the 1930s, the type and amount of traffic on the road has changed substantially. Current vehicles are larger in size than those in the 1930s. As a result, the road no longer safely accommodates current vehicle types, such as recreational vehicles or pickup trucks with trailers that access National Forest and YNP. Projected future traffic volumes will also exacerbate the current situation. In the 1994 Road Inventory and Needs Study, the FHWA concluded Segment 4 was in the worst condition of any portion of the route.

With existing deficiencies, the highway will not adequately accommodate projected traffic and the towns' economies will be at risk. Because tourism employs about a third of all Carbon County workers and the road accounts for most summer tourism in Carbon County and Red Lodge, it is expected that as the road continues to deteriorate, Red Lodge's economy would be at the greatest risk of decline. Services associated with food and lodging, which represent about 13 percent of earnings for Carbon County, would be reduced if tourism associated with scenic driving on the road decreased because of poor road conditions. This concern was the basis for the initial funding for improvements as part of the Crown Butte Mine settlement (the 1998 Department of the Interior and Related Agencies Appropriation Act) and for establishing the project as a High Priority Project in the Transportation Efficiency Act for the 21st Century.

Reconstruction would address seven primary deteriorating or deficient elements that contribute to safety concerns of the existing road:

- Roadway surface
- Road vertical and horizontal alignment
- Travel lane width
- Shoulder width
- Bridges
- Drainage facilities
- Pullouts, parking areas, and access road intersections

Roadway Surface

The FHWA analyzed the pavement condition in 1994 (FHWA 1994a). The road had a Pavement Condition Index of 40 in an index that ranges from a low of 0 to a high of 100. A Pavement Condition Index of 40 indicates pavement in need of major reconstruction.

A pavement preservation project that the FHWA completed in 2000 temporarily repaired the roadway surface. The project was designed to provide a driveable surface for about 5 to 10 years while the environmental review process for the reconstruction project progressed. Because of the resurfacing, some of the deficiencies in the roadway structure may not be readily apparent. For example, subsurface moisture and inadequate drainage have caused the pavement to crack and break-up in many locations. Many of these cracks were filled during the 1999-2000 pavement preservation project, but the underlying conditions that caused the cracks have not been corrected. Consequently, a distressed roadway surface will develop again under current and future traffic volumes, and maintenance costs will increase. Due to the road's narrow width, traffic driving on the edges of the road has caused the pavement edges to ravel (break away from the road). The resurfacing project did not widen the road or add shoulders. Consequently, future traffic will continue to cause the road edge to ravel. Permanent repair of the roadway surface and adequate structural capacity can only be accomplished by reconstruction of the roadbed and the entire base and pavement structure, and providing positive drainage in adequate roadside ditches. In improving the structural capacity and drainage of the roadway, future traffic volumes and vehicle types are used to determine design attributes such as pavement and base thickness, lane and shoulder widths, and horizontal and vertical alignment.

Road Vertical and Horizontal Alignment

The current alignment and gradient of the road is irregular and has numerous sharp curves and abrupt transitions, with sudden dips and crests. For example, the series of eight curves east of Frozen Lake (KP 53.4 to 54.6) has six different curve radii, ranging from 55 m (180 ft.) to 200 m (660 ft.). The inconsistent curve radii cause sudden reductions in speed and do not conform to driver expectations, which can adversely affect vehicle operation and safety. The superelevation (the cross-slope or bank of the road on curves) is excessive in many areas and insufficient in others, causing vehicles to veer into the oncoming lane or off the roadway. The sharp curves and sudden dips and crests restrict the sight distance and cause unsafe driving conditions. As traffic volumes increase, the alignment deficiencies will become more prominent, increasing the potential for erratic vehicular maneuvers and accidents. The alignment deficiencies can only be corrected through reconstruction of the road with a consistent alignment.

Travel Lane Width

Segment 4 currently consists of two 2.75-m (9-ft.) wide travel lanes for a total width of about 5.5 m (18 ft.). In most locations, there is little or no shoulder. About 5 percent of the vehicles (projected 100 vehicles per day in 2025) that use the road are over 6.1 m (20 ft.) long. Vehicles of this length typically are 2.6 m (8.5 ft.) wide without mirrors, and 3.2 m (10.5 ft.) wide with mirrors. The current roadway width does not accommodate these vehicles without encroachment into the oncoming lane or leaving the pavement, particularly on curves. The substandard alignment, coupled with the narrow travel lanes, makes this problem particularly hazardous at restricted sight distance curves. Vehicles leaving the pavement because of the narrow travel lane width also contribute to the pavement edge raveling. Future traffic volumes will exacerbate the width deficiencies. The proposed project needs to provide travel lanes adequate to accommodate existing and projected vehicle volumes and types in 2025. The year 2025 was used because it would be 20 years after the reconstruction project would be initiated, and 20 years is the approximate pavement lifespan and the practical limit of traffic projections. A 20-year traffic forecast period is most commonly used in the road construction industry. Because bridges and retaining walls are a major investment and failures of these structures can have significant consequences for motorists, they are designed to accommodate traffic farther in the future (75 years).

Shoulder Width

The roadway's lack of shoulders is a deficiency that restricts pedestrian and bicyclist use. In most locations, cyclists cannot use the road without causing vehicles to cross over into the adjacent, oncoming travel lane to avoid hitting the cyclists. Because of the road's narrow width, bicycle use of the road is limited and pedestrian use is unsafe in many locations. The FHWA and the SNF anticipate the number of cyclists and pedestrians using the road would increase if the road has shoulders to accommodate such use. The Transportation Efficiency Act for the 21st Century and subsequent FHWA guidance requires "a presumption that bicyclists and pedestrians will be accommodated in new and improved transportation facilities" (FHWA 1999b).

At a minimum width of 0.6 m (2 ft.), shoulders provide protection of the travel lane pavement. On roads without shoulders, the edge of the pavement is prone to breaking off due to lack of lateral support that is provided by the shoulders when vehicles travel outside the travel lane. Shoulders reduce maintenance by preserving the travel lane pavement. The lack of shoulders would be addressed by reconstructing the road with shoulders of an adequate width. The proposed project needs to provide shoulders adequate to accommodate projected vehicle volumes and types as well as recreational uses in 2025.

The lack of shoulders also is a safety concern for vehicular use. When shoulders are an adequate width, they provide a space to escape potential accidents or reduce their severity. Shoulders also provide a location for stopped vehicles, enforcement, or those involved in accidents or mishaps. As the *Needs Associated with Maintenance* section discusses, the road's narrow width and lack of shoulders does not provide room for snow removal or storage.

Bridges

The four bridges within the proposed project are too narrow for current as well as projected traffic volumes and vehicle types that currently use the road. In some cases, the bridges do not provide adequate load carrying capacity. The Beartooth Lake Outlet bridge is 6.8 m (22.2 ft.) wide, the two bridges over Little Bear Creek are 6.2 m (20.2 ft.) wide, and the Long Lake outlet bridge, the widest bridge, is 6.9 m (22.6 ft.) wide (FHWA 1999b). Two large recreational vehicles cannot pass each other on the bridges, and two full-size vehicles, such as two pickup trucks, can barely pass each other.

None of the bridges meet current acceptable safety standards. The bridge railing and guardrails are inadequate. The structural conditions of the bridges vary, with the Little Bear Creek bridge #1 (the western-most Little Bear Creek bridge, west of Top of the World Store) having a fair to poor condition rating, and the Beartooth Lake bridge having a good condition rating. The FHWA estimated the useful life of all bridges under current load limits and without major repairs to be 15 to 20 years (FHWA 1999b).

The Little Bear Creek bridge #1 is not large enough to handle the high runoff flows of the creek because of ice blockage. Often when the road first opens in May, water flows across the road and freezes, creating ice up to 15 cm (6 in.) thick. Ice has caused the abutment wing wall of this bridge to fail completely.

Bridge reconstruction needs to safely accommodate traffic volumes over their design life and meet current design standards. Bridges and retaining walls need to have a design life of 75 years.

Drainage Facilities

Existing drainage facilities, such as ditches and culverts, throughout Segment 4 provide inadequate drainage. Snow drifts at higher elevations typically average from 3.7 to 6.1 m (12 to 20 ft.), and up to 11 m (36 ft.) in some locations. Much of the runoff from melting snow occurs over a 4- to 6-week period in June and July. During runoff periods, the narrow ditches and undersized culverts cannot convey the volume of runoff water, resulting in water flowing over the road. Consequently, ice can develop during cold weather after the road opens in June. Many locations along the road have poorly drained ditches and subgrades. Water seeps underneath the road, saturating the subgrade and base course and reducing the load carrying capacity of the roadway and eventually causes structural failure of the surface from traffic loads.

The road's vertical alignment was built in the 1930s, and its surface is too low to provide adequate drainage and protection from moisture and freezing and thawing. As a result, the road's subgrade and base have failed, leading to pavement cracking and deterioration. For example, the road is constructed in wetlands in the vicinity of Top of the World Store. Before the 1999-2000 pavement preservation project, the pavement had failed because the road's profile is too low and the pavement is subjected to freezing and thawing of subsurface moisture (FHWA 1994a). Along the current alignment, the road's profile in the vicinity of Top of the World Store needs to be raised about 1 m (3 ft.) to provide proper ditch capacity and elevate it above the wet conditions, improving drainage and structural capacity. If not corrected, poor drainage will continue to affect the roadway surface and drainage-related maintenance costs will increase. Only reconstructing the road could improve all the drainage facilities and the road's vertical alignment.

Pullouts, Parking Areas, and Access Road Intersections

Most existing pullouts and parking areas are unpaved, undersized, poorly located, and cause traffic or safety problems. There are numerous locations along the road where poorly located pullouts endanger pedestrians and traveling vehicles (MK Centennial Engineering, Inc. 1998). For example, near Beartooth Falls, several pullouts, many of them informal, are located before and after the Falls, with one inadequately sized turnout that provides actual views of the Falls. As a consequence, vehicles stop in the roadway to view the Falls, which requires passing vehicles to encroach into the oncoming lane. In addition, pedestrians have no place to walk. Other locations where pullouts and parking areas lead to pedestrian-vehicular conflict are near Beartooth Lake, and the switchbacks on the East and West Summits. The conflicts will increase with future increased traffic volumes.

Several access roads to campgrounds and area lakes originate along the road. All of the access roads are unpaved. Sight distances associated with the intersection of some of these roads and the highway is poor.

Reconstructing the road with adequate sight distances would provide the opportunity to enhance the visitor's experience as well as motorist and pedestrian safety by properly locating and sizing pullouts and parking areas, and modifying access road intersections.

Needs Associated with Maintenance

Because no agency has assumed ownership of the Wyoming segments of the Beartooth Highway, including Segment 4, and maintenance funding has been inconsistent, maintenance of the Beartooth Highway has been a problematic issue for several decades. In its deteriorated condition, Segment 4 has high maintenance requirements. The National Park Service has maintained the road historically, but has only been allocated funding for snowplowing from the Forest Service through 2006 of 2007. Although the Forest Service has short-term funding for snowplowing, it is not prepared to assume long-term maintenance. Currently, the average annual maintenance budget is about $200,000 per year. Annual maintenance costs include about $60,000 to open the road in the spring, and $40,000 for snowplowing after the road is open, with the remainder of the budget expended on other road maintenance needs such as materials, personnel, equipment, and maintenance facilities. The maintenance budget does not provide for all of the maintenance activities needed to adequately maintain the road each year.

Snowplowing Difficulties

Snowplowing the road in its present condition is difficult and unsafe. After the road is initially plowed open in late May, snowplowing operations continue through June due to frequent blowing and drifting conditions. Some snowplowing can occur every month of the year that the road is open. The road occasionally is closed for short periods when it becomes impassable due to severe drifting snow conditions. The existing travel lanes are 0.3 m (1 ft.) narrower than standard snowplow blades, which makes it difficult and unsafe to plow the road, especially while it is open to traffic. The road’s narrow ditch width and lack of shoulders limit locations where plowed snow can be stored. Frequently in the spring and fall, snow stored in the narrow ditches melts at the pavement edge and causes substantial gullies along the pavement edge, further undermining and raveling the pavement. A reconstructed road would safely accommodate snowplowing equipment, and provide locations for snow storage and adequate drainage.

Continued Maintenance Requirements

The road’s poor drainage and grade adversely affect the pavement condition, resulting in a continuing maintenance requirement. The raveling caused by vehicles driving on the road’s edge adversely affects the travel lane pavement and increases maintenance requirements. The FHWA completed a 3R project (resurface, restore, and rehabilitate) on Segment 4 in 1968 and a pavement preservation project in 2000. Although both projects temporarily restored the pavement surface, the drainage problems and travel lane width were not addressed. In contrast to Segment 4, Segment 3, which is west of the Clay Butte Lookout turnoff to the intersection of WY 296, was reconstructed between 1968 and 1977. In 1994, Segment 3 had a Pavement Condition Index of 97 to 100, while Segment 4 had a Pavement Condition Index of 40. Until the road is reconstructed and is provided adequate width and drainage, the pavement will continue to deteriorate, and will require pavement repairs to maintain a driveable surface.

Future Sustainable Maintenance

Future sustainable maintenance refers to the ability to provide adequate maintenance, including complete pavement surface rehabilitation in 20 years, with minimal or no environmental impacts and at minimal cost. The proposed project would have a design life of 20 years, and structural elements, such as retaining walls and bridges would have a design life of 75 years. If the road is reconstructed, the FHWA anticipates the road surface would require a minimum 50-mm (2-in.) asphalt overlay in about 20 years to maintain a driveable surface. The proposed project needs to provide roadway elements that would accommodate this future surfacing overlay with minimal environmental impact and cost, while providing a safe roadway for future traffic volumes.

When an overlay is required in the future, the typical process is either to place the overlay on top of the existing pavement, or to grind up and recycle the existing pavement as aggregate base (gravel) and then place the overlay on the recycled former pavement. If the foreslope (the slope immediately adjacent to the roadway shoulders) and roadway width are at critical values already (maximum foreslope steepness and minimum shoulder width allowed by design guidelines), both overlay methods would raise the road profile. This would result in either foreslopes that are too steep to allow recover by run-off-the-road vehicles, or shoulders that are too narrow to function appropriately, or both. These actions would reduce safety for the people using the road corridor.

To preserve the safety characteristics of the road and provide adequate slope ratios and widths, the foreslopes could be reconstructed, disturbing the foreslope's vegetation, and in some cases, ditch bottoms and backslopes. To avoid these problems, the pavement could be ground down, hauled off and disposed of and then resurfacing applied. This method, however, would generate large volumes of asphalt pavement waste and pollution from trucks hauling material. It also costs almost twice as much as a simple overlay.

Therefore, future sustainable maintenance requires the ability to overlay the pavement while maintaining a safe foreslope and shoulder, and avoiding future additional environmental impacts from resurfacing. To meet these criteria, the design of the reconstructed road would need to: 1) allow for an overlay with minimal environmental impact; 2) provide a shoulder width that would either not be narrowed or could be narrowed to no more than a minimal width; and 3) provide a foreslope ratio and width that would minimize or avoid disturbing the foreslope and avoid reconstructing ditches and cut/fill slopes during resurfacing; and maintain adequate foreslope ratios for recovery of errant run-off-the-road vehicles.

Lack of Jurisdiction

Under the National Park Approaches Act of 1931, the Beartooth Highway was built as an approach road to provide the general public access to YNP from Red Lodge, Montana. Under the Act, the approach roads had to cross lands of 90 percent Government ownership and had to be a part of or tributary to a Federal Aid Primary road system.

The National Park Approaches Act allowed the Secretary of the Interior to:

> "…construct, reconstruct, and improve national-park approach roads so designated, inclusive of necessary bridges, and to enter into agreements for the maintenance thereof by State or county authorities, or to maintain them when otherwise necessary…" (Public Law 592, Ch. 79, 46 Statute 1053, 1931)

In 1932, an Executive Order withdrew a 75-m (250-ft.) wide corridor on either side of Segment 4 from settlement, sale, mineral entry or other disposal, and reserved the lands as an approach road to YNP. No federal or state agency currently claims ownership of the road. Ownership of the land adjacent to Segment 4 remains with the Federal Government, and the SNF manages the National Forest land adjacent to the road.

Since the road was built, the Secretary of the Interior has been unable to interest either Montana or Wyoming in a maintenance agreement for the section of the road from YNP to the Montana/ Wyoming state line at KP 69.4. The State of Montana has maintained the section from Red Lodge to Rock Creek since it was built. (Rock Creek is in Montana about 13.8 km [8.6 mi.] south of Red Lodge). Before 1945, the Bureau of Public Roads, FHWA's predecessor, maintained the road to Rock Creek with funding from the NPS. After 1945, the NPS maintained the road from YNP to Rock Creek. In 1965, the Montana Department of Transportation (MDOT) began maintaining the segment between the Montana/Wyoming state line at KP 69.4 and Rock Creek.

In its current condition, Segment 4 is very difficult to maintain. Consequently, neither Montana nor Wyoming has assumed ownership of this section of the road. Neither state has put the section of the road from YNP to KP 69.4 on its State Transportation Plan. When a road is on a State Transportation Plan, the state assumes responsibility for the road's jurisdiction and maintenance. If the Wyoming section of the Beartooth Highway was on Wyoming's State Transportation Plan, it would be maintained in a similar manner as other area roads, such as WY 296 or WY 120.

The NPS has maintained Segment 4 historically. In its current condition, road maintenance costs are high. Under 16 USC Section 17j-2(a), appropriations for the NPS are authorized for "maintenance of the roads in the national forests leading out of Yellowstone National Park." Although Congress is authorized to appropriate funds for maintenance, the NPS is not allocated such funding. Because the NPS is not allocated regular funding for snowplowing or maintenance of the Beartooth Highway, the road occasionally is not adequately snowplowed or maintained. For example, in the mid-1990s, the NPS did not open the road by Memorial Day (as is usually done) because of a lack of funding. In the 1998 Department of the Interior and Related Agencies Appropriation Act, the USFS was given the responsibility and funding through 2006 or 2007 for snowplowing of the Beartooth Highway from KP 0 in YNP, into and through Wyoming, to KP 69.4 on the Wyoming/Montana state line. The USFS contracts with the NPS to meet this required snowplowing responsibility. The USFS also provided funding to the FHWA for the 1999-2000 pavement preservation project. While the USFS was provided funding for these recent activities, it is not prepared to assume long-term maintenance responsibility because of insufficient funding, personnel, and equipment to plow and maintain a paved highway.

In 1997, a Steering Committee was established to provide oversight of funding, maintenance, and ownership issues of the Beartooth Highway. Steering Committee members consist of representatives from FHWA, NPS, USFS, WYDOT, MDOT, and Congressional staff. In 1999, the Steering Committee established long-term goals concerning ownership and responsibility for the improved roadway. The target date for achieving the goals is 2010, when Segments 1 and 4 are expected to be reconstructed. With these reconstructed segments, the entire Beartooth Highway will then be to appropriate standards and all ownership and responsibility issues resolved. The Steering Committee identified these long-term goals:

State Ownership: The Steering Committee's first preference is that the States of Wyoming and Montana will accept shared ownership and responsibility for the Beartooth Highway in the following manner:

- Segments 2, 3, 4 would be owned and maintained by the State of Wyoming.
- Segments 1, 5, 6, 7 would be owned and maintained by the State of Montana (Segments 5, 6, and 7 are currently maintained by the State of Montana).

Federal Ownership: If Wyoming and Montana do not agree to assume responsibility for the highway, then legislation should be considered to determine federal ownership, responsibility and funding. Currently, the NPS has the workforce but not the funds and the USFS has neither the funds nor the workforce to properly maintain the pavement and structures. In the meantime, the NPS would be left with the status quo, a band-aid approach to maintenance and operation, sacrificing funds needed for road work in YNP.

The Wyoming Transportation Commission has discussed ownership of the Wyoming section of the Beartooth Highway on several occasions. In October 1998, the Commission passed the following resolution:

> "When the entire section within Wyoming is reconstructed to current standards, Wyoming will **consider** assuming ownership of U.S. 212 in northwestern Wyoming. Because of the time frame required to accomplish the reconstruction, Wyoming will not make a definite commitment that encumbers future transportation commissions and could possibly encumber a different Governor." (Meeting minutes, Transportation Commission of Wyoming, October 14, 1998) [bolded emphasis in original].

If the State of Wyoming does not agree to accept jurisdiction and maintenance responsibility after reconstruction, the maintenance responsibility will remain with the Department of the Interior. The proposed project needs to provide a roadway with design features compatible with current maintenance equipment and techniques, affording safe and efficient maintenance practices, as required by law for the use of federal highway funds. Specifically, the proposed project needs to provide for easier and safer snowplowing, a more durable pavement surface, improved drainage features, and future sustainable maintenance that is less expensive and will have little to no impacts from future maintenance needs on the surrounding environment.

Block 20: Reasons for Discharge

The reasons for unavoidable discharge into wetlands and other waters of the U.S. include construction of retaining walls, bridge abutments, and embankment to support the reconstructed roadway. Unavoidable discharges of fill into wetlands and other waters of the U.S. will result from reconstruction of six elements of the existing road:

- Embankment to support proposed roadway surface
- Embankment to support access road intersections
- Construction of temporary access roads for bridge construction
- Drainage facilities
- Abutments to support bridges
- Riprap to protect abutments from hydraulic scour

In addition, incidental fills in wetlands outside of the construction boundary may result from:

- De minimis incidental fill
- Rock blasting
- Bucket dribble
- Removal of abandoned roadway and creation of wetland mitigation areas
-

Block 21: Types of Material being Discharged and the Amount of Each Type in Cubic Yards

The *Conceptual Wetland Mitigation Plan* (ERO 2002) contains figures showing the construction limits used to calculate the volume of fill proposed to be placed in about 2.0 ha (5.0 ac.) of jurisdictional wetlands and other waters. Proposed fill types will include: coarse soil fill with granite gravel to be used as road base; concrete for the bridge abutments at Long Lake; and riprap of varying sizes to protect bridge abutments at the Beartooth outlet bridge and two bridges on Little Bear Creek, and to protect culvert outfalls, and bedding on which culverts will be placed (Table 4).

Table 4. Material being discharged.

Material Type	Cubic Meters	Cubic Yards
Coarse soil fill with granite gravel	11,170	14,610
Concrete (bridge abutments)	150	200
Riprap (bridge protection and culvert outfalls)	1,260	1,640
Culvert bedding (coarse sand)	110	150
Total	12,700	16,600

Block 22: Surface Area in Acres of Wetlands or Other Wetlands Filled

The locations of wetlands within the construction limits are shown in Figures 14 through 52. The surface area in acres of jurisdictional wetlands and other waters of the U.S. filled or temporarily disturbed within the construction limits are listed in Table 5. Actual area filled will be presented during final design. Table 6 and Table 7 (after the references) contain additional descriptive information about wetlands and fens, and area impacted by the proposed action.

Table 5. Surface area of jurisdictional wetlands or other waters either filled or temporarily disturbed within construction limits.

Type	Alternative 6	
Wetlands		
Jurisdictional wetlands	2.0 ha	4.8 ac.
Jurisdictional fens	0.0 ha	0.0 ac.
Total	2.0 ha	4.8 ac.
Other Waters		
Lakes and ponds*	<0.1 ha	0.1 ac.
Streams†	607 m	1,991 ft.

Totals shown are for jurisdictional wetlands or other waters within the construction limits. Actual fill area will be less than 2.0 ha (4.8 ac.) and will be calculated during final design.
Discrepancies may occur in the totals and in the conversion of hectares to acres due to rounding.
*Includes jurisdictional other waters and <0.1 ha (<0.1 ac.) of isolated other waters at Frozen Lake.
†All streams within project construction limits are jurisdictional.

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